Space Weather Forecast

Issued on Tuesday, 21 March 2023 at 12:34 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of M-class flares. G1-G2 Minor/Moderate storms likely day 3 (23rd) due to the fast winds from a coronal hole along with possible glancing coronal mass ejection arrivals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with the largest flare a mid-level Common-class flare at 20/1534 UTC from a region in the northeast disc. There are seven sunspots on the disc, with the most notable of these spots are in the southeast disc. One of the larger groups has split again into two moderately sized spots but retains a small complex configuration in its northernmost spot. The other largest spot, also in the southeast quadrant, has shown some decay in its small trailing spots but maintains a strong and moderately sized leader spot. The other sunspots on the disc are mostly simple and currently have a lower chance of flaring, however a recently numbered group in the southwest is the region that has shown recent growth.

The Earth-facing disc also has a number of filaments (arcs of material held together by the Sun's magnetic field) across it, and one of these was observed erupting in the northeast disc around 20/1300 UTC. This resulted in a coronal mass ejection (CME) which has been analysed as likely glancing Earth on the 23rd. Further similar events are possible. A second, potentially Earth-directed CME was observed leaving the southwest disc early on the 20th. The source of this was likely a reconfiguration of the Sun's magnetic field, leading to some material being released. Analysis has been completed and also gives the low chance of a glancing pass on 23rd.

Solar Wind / Geomagnetic Activity: The solar wind speed has been slightly elevated and variable, between 390-480 km/s. The magnetic field strength was mostly weak, occasionally moderate, with the north-south component similarly variable. Geomagnetic activity was Quiet to Active (Kp 1-4), with the strongest activity 20/1500-1800 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remains just above background levels after the S1/Minor Solar Radiation Storm that occurred last week, however this is still well below the S1/Minor Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low Solar activity is expected, with a chance of isolated Moderate flares, and a slight chance of an X-class flare. These most likely from the regions currently on the southeast disc, or from other regions rotating over the eastern limb over the coming days.

Solar Wind / Geomagnetic Activity: A CME from the northeast filament eruption on the 20th may give a glancing arrival around 23/1100 UTC. A further CME from the 20th has a low chance of glancing Earth, also on 23rd. Fast winds from a small coronal hole are expected to give a modest enhancement on day 1 (21st). A further, larger and stronger coronal hole is then

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

expected to give an enhancement either later day 2 or during day 3 (22nd or 23rd). Quiet geomagnetic activity, with Unsettled intervals, is expected to become Unsettled for a time with a chance of Active intervals day 1 (21st). Activity also increasing day 2 and during day 3, with Active to G1 Minor storm intervals likely due to the coronal hole and potential CME influence. Unsettled to Active conditions likely follow day 4 (24th) with an ongoing chance of G1 Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue very gradually and erratically declining towards background with only a very slight chance of further enhancements given any significant flares occur.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Met Office

Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	60	40
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.